PUBLIC SCHOOL HEALTH BULLETIN ~~NO. 2~~

NUMBER 3

HEALTH TALKS

FOR

PUBLIC SCHOOLS

I—XV

ISSUED FROM OFFICE
SUPERINTENDENT OF PUBLIC INSTRUCTION OF NORTH CAROLINA
RALEIGH, AUGUST, 1910

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I—XV

PUBLIC HEALTH
CAUSE AND PREVENTION OF TYPHOID FEVER

ISSUED FROM OFFICE
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INTRODUCTORY LETTER OF STATE SUPERINTENDENT OF PUBLIC INSTRUCTION.

Healthy bodies are a necessity for the enjoyment of life and for the effective application of every sort of education to the doing of a man's work in the world. Disease decreases efficiency; premature death ends it ere it is well begun. What shall it profit a nation if through education it gain all knowledge and all power, intellectual and spiritual, but through disease lose its physical vigor, its body, by which alone it can act upon the world? The prevention of disease, the preservation of health and the prolongation of life through the dissemination of a knowledge of the simple fundamental laws of health and sanitation among the rising generation, should be one of the most important missions of education and one of the most sacred civic obligations of this age.

To assist the thousands of teachers in the public schools of North Carolina in the intelligent discharge of this sacred obligation to the rising generation, this series of simple health talks has been prepared, at my request, under the direction of Dr. W. S. Rankin, Secretary of the State Board of Health of North Carolina.

At least three of these talks a week should be given to the entire school by the teacher, preferably just after the opening exercises. The teacher should acquaint herself thoroughly with the contents of the bulletin and present the substance of each talk to the children orally in such language as the youngest child as well as the oldest can easily understand, frequently supplementing the talks contained in the bulletin with material illustrations drawn from other authentic sources, and sometimes from the everyday life, experience and observation of the teacher and the children in school and home. Teachers are hereby urged and directed to present in the logical and progressive order of this bulletin to all the children of their schools at least three of these talks each week. County superintendents are hereby directed to enforce this requirement in their schools.

The examination on Physiology and Hygiene required for teachers' certificates will hereafter comprehend all subjects contained in these health bulletins.

Very truly yours,

J. Y. Joyner,
Superintendent of Public Instruction.

Raleigh, N. C., August, 1910.

CONTENTS

CITIZENSHIP AND PUBLIC HEALTH.

Health Talk No. I.

Ideas to be presented—(a) Principle of citizenship. (b) Relation of knowledge to. (c) Prevention of death the first duty of the enlightened citizen. (d) How you can help prevent death.

The essential difference between the citizen and the savage is the expression in his daily routine by the former of the principle, "No man liveth unto himself." This biblical axiom is the basis of civilization, because it expresses a relation that law defines and controls. It naturally follows that the clearer our mental perception, the more distinctly will we recognize the many and subtile bonds that unite our fortunes or our fates into a web of weal or woe. Knowledge gives acuteness of mental vision, and, therefore, it is knowledge that opens the gates of a higher civilization and gives to him who desires the opportunity to become a better citizen.

The relation of one man's property to another's is easily recognized, and is firmly established upon universally accepted principles of civil law. The relation of one man's life to another's has only within the last half century been established upon principles of natural law. But, as yet, the knowledge of these natural laws has not been widely enough disseminated to produce sufficient public sentiment to weld them into our statutes.

Man's greatest civic obligation is to the public health. This sounds like the exaggeration of an enthusiast. Nevertheless, it rests upon those primary and fundamental principles of law, the decalogue, that for over four thousand years have been the basis of civilization. Writ in tables of stone by the Supreme Judge Himself, these legal principles are so comprehensive as to embrace man's every possible relation: His relation to the Court of Heaven; his relation to the court of the home, and his relation to the court of man. But note, and note carefully, that the *first* of the five rules governing man's relation to man is the law protecting life. First, not by haphazard, but first by Omniscient design, because it is just as fundamental to the last four of these five laws as life is fundamental to chastity, property, reputation, and neighborly comfort. Note further, that "Thou shalt not kill" carries no provision limiting its application to the 5,000 deaths occurring annually in the United States through willful acts of commission, murder, and excluding the 500,000 deaths from preventable disease annually occurring in our country by an act of passive omission. Every citizen who does not take a serious interest in the public health of his or her community is a partisan to this criminal destruction of life.

And now we reach the important question, namely, how can you help prevent disease and death? You can do this by, first, giving careful attention to the morning "health talk," through which you will be convinced of the importance of the subject; and, second, by learning through these health talks of the simple methods of preventing the common diseases. You may be able to save your own life, as well as the lives of others.

OUR CHIEF ASSET.

HEALTH TALK No. II.

Ideas to be presented—(a) Progress dependent upon quality, rather than quantity of thought. (b) Fine thinking largely conditioned on health. (c) Economic value of man. (d) Humanitarian value of man.

The relation of health to progress is well brought out by Professor Irving Fisher in *National Vitality*. He says: "Just as in warfare it is not so much the gun as the man behind the gun that makes for success, so in industry, as Doctor Shadwell has shown, skill, knowledge, and inventiveness are the chief factors in determining commercial success and supremacy. The backward nations, like China, are characterized by lack of modern inventions. The nations which are industrially most advanced have the railway, the steamship, the power loom, metal working, and innumerable arts and crafts. The change of Japan from a backward to a forward nation is at bottom the introduction of inventions. * * *

"Future industrial competition will be increasingly a contest of invention. The world rivalry to develop the best system of wireless telegraphy or the best airships is but one example. The future will see the greatest strides taken by the nation which is the most inventive. Now, the primary condition of invention is vitality, a clear brain in a normal body. It is no accident that Edison is a health culturist, or that Krupp, Westinghouse and other pioneers in industrial development have been men of vigor of mind and body.

"Finally, the conservation of health will promote the conservation of other resources by keeping and strengthening the faculty of foresight. One cause of poverty in the individual and the nation is lack of forethought.

"One of the greatest symptoms of racial degeneracy is decay of foresight. Normal, healthy men care for and provide for their descendants. A normal, healthy race of men, and such alone, will enact the laws or develop the public sentiment needed to conserve natural resources for generations yet unborn. When in Rome foresight was lost, care for

future generations practically ceased. Physical degeneracy brought with it moral and intellectual degeneracy. Instead of conserving their resources the spendthrift Romans, from the emperor down, began to feed on their colonies and to eat up their capital. Instead of building new structures they used their old Coliseum as a quarry and a metal mine."

The value of health is the value of man. And what is the value of the average man? Man, like any other animal—like the sheep, or cow, or horse—has an economic value. A half century ago men capable of furnishing only the cheapest labor—unskilled labor—were bought and sold at from $750 to $1,000 apiece. The average immigrant pays taxes, and produces property on which others pay taxes, thereby increasing the government's revenue to the extent of an amount equal to the interest on a principal of $875. The value, therefore, of the newly landed immigrant is $875. Experts on fixing values, basing their estimates on statistics applying to hundreds of thousands of individual lives, have found that the average American produces $2,900 more than he consumes. The vital assets of the United States would be 85,000,000 lives × $2,900, the value of each, or $250,000,000,000. The material wealth of our country, estimated by a government expert, amounts to $108,000,000,000.

But, "Is not the body more than raiment, and life more than meat?" Man is more than an animal; man has, in addition to his economic value, a higher value—a humanitarian value. Surely, the value existing in all, but in such quantity as to stand out in bold relief in the lives of Washington, Lincoln, Franklin, Lee, Pasteur, Shakespeare and Tennyson, can not be reduced to cold, dead metal. Who can estimate the world's loss had any of these made one of the deaths from preventable disease which destroys 25 per cent of all people before their twentieth year is reached? Who can compute the world's loss when untimely and preventable tuberculosis cut off in their prime John Paul Jones, Robert Louis Stevenson, John Keats, Schiller, Von Weber, Chopin, Bichat, Laennec, Timrod, Artemus Ward, Thoreau, and many others? And yet how many of such as these do we bury every year with the forty thousand babies dead of preventable disease—the sacrifice of our boasted civilization to the Moloch of ignorance and indifference! Think of the unnecessary infant graves over which might truthfully be inscribed,

> "Some mute, inglorious Milton here may rest,
> Some Cromwell guiltless of his country's blood."

OUR GREATEST LOSS.

HEALTH TALK NO. III.

Ideas to be presented—(a) Our death rate. (b) Number of preventable deaths. (c) Financial loss to country from preventable disease. (d) Individual application of this loss.

In the United States during the next three or four minutes ten or twelve people will die; the next sixty minutes will be the hour of death for 175 others, and today's sun will set on 4,000 new-made graves, while as many undertakers will make preparation for tomorrow's repetition of today's tragedy.

This means, according to the United States Census Reports, 1,500,000 deaths in the United States every year. It means, in addition, an amount of sickness productive of a loss of labor equivalent to the total incapacitation for the entire year of 3,000,000 people. Forty-two per cent of the 1,500,000 deaths, or 600,000 deaths, are preventable. The testimony of expert opinion, of scientific facts, and of actual results to the truth of this statement is convincing.

Political economists estimate that the productive energy wasted through preventable disease amounts to a financial loss to the United States of over $1,000,000,000 annually. This is more than enough to pay the entire annual expenses of our national government; enough in one year to both dig and fortify the Panama Canal. Preventable disease is, therefore, a grave public concern.

But, is it not a problem of tremendous importance to the individual—to you? Let's see. Divide the total loss to the United States from this cause by the total population—$1,000,000,000 ÷ 85,000,000—and we find that preventable disease taxes the individual $11.75 per annum. Satisfy yourself on this point. Take ten neighboring families; estimate their expenses from sickness from tuberculosis, malaria, typhoid, and hookworm; add to this 80 per cent of the expenses from summer diarrheas, and 50 per cent of the expenses from the contagious diseases of childhood; add losses from death estimated as follows: child under one year of age, $90; child five years old, $950; child ten years old, $2,000; person twenty years old, $4,000; thirty years old, $4,100; fifty years, $2,000. Then remember there are many losses from physically defective eyes, ears, throats, and other organs which should have been recognized before their damage was done. All these expenses compounded will make a per capita tax from ten to twenty times larger than the government per capita tax of a citizen of this State.

But it is the part of human nature to think of self as the exception to the rule. I have in mind now a family living on a farm where

no case of typhoid has occurred in the fifty years in which this place has been used as a home. The head of this family has frequently boasted of the freedom of the place and family from the disease. The country isolation of this home, the surface contour of the yard and surroundings, the depth of the well, and the unknown occurrence of the disease on that hill might persuade one to regard this family as an exception to the rule of one case of typhoid to six of a family; might persuade the head of such a family to feel a bit indifferent to the typhoid problem. The children are growing up, like all other children, one by one they are leaving the place of safety and coming under the general rules which govern their kind. The two oldest, the two that have been away from home the longest, have both had typhoid, giving even in that apparently typhoid-free family, the rule *more* than its dues, 1 out of 5, instead of 1 out of 6.

The wise man governs his life by rules—by probabilities, not by exceptions. If you are wise, so live that preventable disease will long delay taking toll of you and yours; this means, study the question of health.

RELATIVE EFFECT AND COST OF WAR AND DISEASE.

HEALTH TALK NO. IV.

Ideas to be presented—(a) War a lesser foe of man than disease. (b) Our greatest effort directed against the lesser foe.

The ratio of mortality in war, for two hundred years, has been 4 from disease to 1 from bullets. In the Mexican and Civil wars this ratio was 3 to 1. In the Boer War the ratio was 7 to 1. In the Spanish-American War, owing to lack of sanitary authority, this ratio reached its maximum—14 to 1. In the Russo-Japanese War, where the laws of sanitation were enforced with rigid military discipline, the ratio of centuries was reversed, and the mortality was 1 from disease and 4 from bullets.

More lives are lost *each* year in the United States from preventable disease than have been lost in all our wars combined—Indian, Revolutionary, War of 1812, Mexican, Civil, and Spanish-American. In the Spanish-American War about five soldiers died from typhoid fever to every one killed by shot and shell. The United States mustered *a hundred thousand soldiers* to rid Cuba of the Spaniard, and sent *three* men to Cuba to rid the island of yellow fever, the plague of the tropics. The Spaniard was driven out and yellow fever was conquered. The city of Havana, from 1850 to 1900, suffered an annual average loss of 750 lives from this disease. In addition, there was an annual average sickness from this disease of 2,250 others. The financial loss through the de-

struction of productive energy from death and sickness, from diminished trade as a result of the prevalence of a fearful epidemic, and from expensive and unnecessary quarantine, amounted to an annual average loss of over $200,000. Since the discovery of the easy method of controlling the disease—that is, since 1900—there has been an annual average of only four deaths from yellow fever in Havana. Most of these cases contracted the disease elsewhere and developed the fever after visiting Havana. Commerce is now no longer afraid to enter this harbor, even when a case or two of Yellow Jack (there are never more) exists. No more expensive and unnecessary quarantine burdens the taxpayers. And, as in Havana, so in Rio de Janeiro, the Canal Zone, and elsewhere. Major General Leonard Wood has said that the discovery of the method of controlling this disease saves the commercial interests of our country each year more than the entire cost of the Spanish-American War.

Disease is far more costly than war, and the results of disease prevention more humane and more valuable to the race. And yet, of the total annual expenses of our national government for 1909, $800,000,000, $560,000,000 or 70 per cent went for pensions and the army and navy, or for wars past and wars anticipated; only 3 per cent was spent directly and indirectly for health, and only 1 per cent was spent directly for health. Our own State government is spending two dollars for military equipment to one for public health—not too much for our three regiments, but too little for our people's lives.

VICTORIES OF PEACE, OR THE RESULTS OF SANITARY SCIENCE.

HEALTH TALK No. V.

Ideas to be presented—(a) Relative value of warrior and scientist. (b) The sanitary conquest of the Canal Zone. (c) The control of yellow fever. (d) The control of malaria.

"Peace hath her victories no less renowned than war."
—*Milton.*

The thunder of artillery, the battle clouds, the ghastly wounds, the crimsoned sod, and the cries and shrieks of agony make a picture that focuses and holds the attention paralyzed with horror. On the other hand, the quiet, unobserved laboratory worker, as he wrestles day in and night out with the forces of Nature for the knowledge that is power, attracts no uncommon attention, until the general educational effect of time brings the masses abreast of the advanced position long since occupied by their, then, unknown leader.

The leader with battle background creates a profound impression; the leader with scientific acumen passes unnoticed, but leaves an impression as lasting as the truth of which his life became a part. Napoleon is an example of the first, Pasteur of the second. In 1906, a well-known Paris newspaper made a poll of the French people and Pasteur was voted the greatest Frenchman that ever lived. Such was not the popular estimate of Pasteur during his lifetime or immediately after his death.

We have all heard of Hobson, but how few know of the less ostentatious but greater heroism of Lazear and Carroll. Fully realizing what only a few could then realize, and without the plaudits of the public, they exposed themselves to a greater danger than an exploding magazine in order to test the mosquito origin of yellow fever. They gave their lives in the experiment, but, as a result, 2,000 lives are saved annually in Cuba and Mexico alone, the Panama Canal is being dug, and yellow fever is no longer a disease that strikes terror to the heart.

It is estimated that the attempt of the French to dig the Panama Canal cost them 50,000 lives, most of them destroyed by yellow fever and malaria. In 1887, the death rate in the Canal Zone amounted to the loss of 1 person out of 10, or 100 out of every 1,000, *per annum*. The hospitals were overcrowded, and it is stated on good authority that the high death rate was the principal reason the French abandoned the undertaking. In 1905, when the United States began work on the Canal, the death rate *per annum* was 65 per 1,000 of the population. In four years Colonel Gorgas, the distinguished sanitarian in charge of health conditions there, reduced the death rate to 25 per annum per 1,000 of the population. It will be seen that 40 lives more are saved in every 1,000 of the population, and, as there are 120,000 people in the Canal Zone, this means a saving of 4,800 lives, annually, more than formerly.

Yellow fever, as has been said already, is a conquered disease. From 1850 to 1900 the city of Havana alone averaged 750 deaths a year from this disease. Since the discovery of Lazear and Carroll and the application of their discovery, there has been an average of not over 4 deaths per year from this disease in Havana. Vera Cruz Province, Mexico, that had never been free of the disease in fifty years, has not had a single case of the disease in the last four years. And, as in Havana and in Vera Cruz, so everywhere else that the very simple remedy for the prevention of this disease has been applied, it has disappeared.

Malaria is another disease that has yielded to man just in proportion to the educational effort directed against this disease. In Italy, one of the most malarious countries in the world, with a very general educational campaign against malaria, there has been in the last eight years a 75 per cent reduction in the malarial death rate. The average annual death rate from malaria before this campaign was 16,000; it is now 4,000; 12,000 lives are saved thereby each year.

A large number of cities and malarious provinces in other countries have, to varying degrees of effectiveness, adopted anti-malarial measures with results ranging from a 33 per cent to an 80 per cent reduction in their malarial death rate. In Ismalia, a town of 8,000, and in Port Swettingham and Klang, a town of 6,000, where malaria affected about 50 per cent of the population and was evidently sapping the life—physical and industrial—out of these places, a vigorous anti-malarial campaign has *completely* exterminated the disease.

THE VICTORY OF VACCINATION—THE BATTLE WITH SMALLPOX.

HEALTH TALK No. VI.

Ideas to be presented—(a) The importance of Jenner's discovery. (b) Smallpox before vaccination. (c) Comparison of vaccinated and unvaccinated population. (d) Protection of vaccination almost a complete protection.

The victory of science over smallpox through vaccination is one of the greatest sanitary victories ever won. Jenner, the discoverer of this method of prevention, is considered by many authorities the greatest benefactor of the race that ever lived.

Lord Macaulay, in his History of England, describing the disease in England before vaccination, wrote: "That disease over which science has achieved a succession of glorious and beneficent victories, was then the most terrible of all ministers of death. The smallpox was always present, filling the churchyards with corpses, tormenting with constant fear all whom it had not yet stricken, leaving on those whose lives it spared the hideous traces of its power, turning the babe into a changeling at which the mother shuddered, and making the eyes and cheeks of a betrothed maiden objects of horror to the lover."

In the latter part of the eighteenth century and the early part of the nineteenth century one-tenth of all deaths in civilized countries resulted from this disease. Ninety-five per cent of the population of Europe had the disease at some period of their lives. Every year in Europe 400,000 deaths were caused by this "*pesta magna*" (great pest).

Some countries have taken advantage of this great discovery; others have not had the faith in this truth necessary to save. It may be interesting to observe the effect of smallpox where vaccination is compulsory and where it is only optional. Between 1870 and 1874, in three years, an epidemic of this disease in Austria and Prussia caused the death of 162,000 Austrians and 172,000 Prussians. Prussia, profiting by her dreadful experience, passed a compulsory vaccination law; Austria did

not. Result: Prussia, with a population 8,000,000 greater than Austria, lost, in the next twenty years, 8,500 people from this disease, while Austria, during the same time, lost 239,000.

Another demonstration of the saving power of vaccination is seen in the French and German army in the great war between these countries. The French army had not enforced compulsory vaccination; the German army had, and the German soldiers were all vaccinated. Result: The French army lost over 25,000 soldiers from smallpox; the German army, although holding the French prisoners and living with them, lost only 350 from the disease.

Still another demonstration of the protection afforded by vaccination is seen when we compare the annual death rates per million population in countries with compulsory vaccination and those without compulsory vaccination.

Compulsory vaccination: Germany, 1.1; Denmark, 0.5; Sweden, 2.1; Norway, 0.6.

Non-compulsory vaccination: Belgium, 99.9; Russia, 46.3; Spain, 56.3; Hungary, 134.4.

In this connection it is well to remember that it is not claimed that vaccination will always prevent smallpox. It furnishes a protection equal to that of having had the disease, but a few people will have the disease twice.

OTHER GREAT SANITARY VICTORIES.

Health Talk No. VII.

Ideas to be presented—(a) The victory over diphtheria. (b) The victory over typhoid fever. (c) The victory over consumption or tuberculosis.

The mortality from diphtheria, once one of the most dreaded diseases, has been reduced 80 per cent since 1895. Do you realize what this means? It means that, basing the estimate on the census reports, 100,000 lives are now being saved every year in the United States alone. This is due to the discovery by von Behring of antitoxin as a cure and preventive of this disease. The French and German governments gave von Behring $50,000 as a prize for what they considered the discovery most beneficial to man that was made between the years 1850 and 1900.

Typhoid fever has had its mortality reduced 33 per cent during the last forty years. Many cities have reduced their typhoid mortality from 45 to 98 per cent by installing filters for their public water supply. Many of these cities have still further reduced their typhoid death rate 20 to 30 per cent by providing intelligent dairy inspection. After a

pure water and milk supply have been provided the remaining cases will disappear just in proportion as the sanitary intelligence of the community grows. And the food for this growth must be furnished by the press and public schools.

Tuberculosis, certainly the greatest disease problem before the world, destroying each year in the United States 150,000 lives, is yielding just in proportion to the extent of the educational campaign waged against it. For example, in Germany, with its present rate of decrease continuing thirty years, the disease will be exterminated.

During the last half century the mortality from consumption or tuberculosis among the English-speaking people has dropped 49 per cent. In England and Wales, from 1870 to 1906, the mortality was reduced about 60 per cent. Should the present rate of decrease in England continue forty years, that country will be free from the disease.

Prussia, in the twenty years between 1886 and 1906, has reduced her tuberculous death rate about 45 per cent.

In five Eastern States and ten cities of the United States the tuberculous mortality has been reduced 18 per cent since 1887. Massachusetts, the foremost State in the Union in public health work, has reduced her tuberculous death rate 63 per cent during the last fifty years.

GENERAL EFFECT OF SANITARY PROGRESS.

HEALTH TALK NO. VIII.

Ideas to be presented—(a) The individual as an economic liability and asset. (b) Sanitation from a business standpoint. (c) The general effect of sanitary science in increasing the average duration of life. (d) Increased efficiency.

From an economic standpoint, the average American child is a liability until its seventeenth year, after which time it becomes an asset. That is to say, it is necessary for the individual and the public to contribute to the physical, mental and moral development of a child until it reaches its seventeenth year. After the seventeenth year the average American child becomes self-supporting and, in addition to its own support, becomes a source of revenue for others, individuals and for the government of public. Death before seventeen means a financial loss of all that the individual and public have invested in the child; after seventeen, the longer death is delayed the greater the returns on the investment. Anything, therefore, that diminishes the probability of death before seventeen and increases the probability of life after seventeen is financially and individually a public blessing. Such a blessing is sanitary progress from a business standpoint.

Going back to the oldest reliable statistics in existence on the duration of life, we find that in the sixteenth century the average duration of life was 21.2 years; at the beginning of the nineteenth century about 30 years; at the present the average duration of life is 44 years. During the last quarter of the nineteenth century, the most active period in the growth of natural science, the average duration of life increased at the rate of 25 years per century, and, between 1890 and 1900 the increase in Massachusetts was at the rate of 40 years per century. The following table summarizes present progress in the lengthening of life:

Present rate in Massachusetts, 14 years.

Present rate in Europe, 17 years.

Present rate in Prussia, 27 years.

In India, where sanitation is unknown, the average duration of life is 23 years, or what it was about 40 years ago.

Just as the light of sanitary science rises nearer the meridian of perfection, so the shadow of death shortens.

GENERAL EFFECT OF SANITARY PROGRESS (Continued).

HEALTH TALK NO. IX.

Ideas to be presented—(a) The relation of disease and civilization. (b) The possibilities of the tropics under sanitary control. (c) Individual responsibility for preventable disease is based upon the established preventability of these diseases.

TROPICAL CIVILIZATION.

In a recent work entitled "Mosquito or Man," Sir Robert Boyce, in the preface, says: "Finally, if results are looked for, it can be said without exaggeration that the tropical world is to-day being steadily and surely conquered. The narration of the numerous campaigns against the mosquito which I have here recorded is signal proof of this. The campaigns show that the three great insect-carried scourges of the tropics—the greatest enemies that mankind has ever had to contend with, namely, Malaria, Yellow Fever, and Sleeping Sickness—are now fully in hand and giving way, and with their conquest disappears the awful and grinding depression which seems to have gripped our forefathers. Now the situation is full of hope. The mosquito is no longer a nightmare; it can be got rid of. The tropical world is unfolding once again to the pioneers of commerce, who now do not dread the unseen hand of death as did of old the Spanish Conquistadores of Columbus and Cortes. The British public has and must always have a paramount

interest in this practical conquest, which is destined to add a vast slice of the globe, of undreamt-of productiveness, to their dominions and activities."

Why has the strong northern blood which nature attempts constantly to pour into tropical lands, failed to gain a foothold? Why have the tropics not been civilized? Why has the most fertile section of the globe remained uncultivated? Does the northerner forsake the tropics on account of heat or sickness?

Gorgas in the Canal Zone has demonstrated that the American can live in the tropics with as much safety and do as much work as he can in the United States. It is not heat, but death that drove the French from this region twenty years ago,—death from malaria and yellow fever that buried 50,000 of their laborers before they forsook the tropics. The gate to tropical civilization has been locked for centuries by the mosquito and the fly that carries sleeping sickness.

Evidence is accumulating that suggests, and goes a long way toward proving, that the fall of Greece was due principally to tropical diseases imported through their soldiers returning with prisoners, both infected, with malaria and other tropical diseases.

(Health talks on the subject of malaria will follow in a later bulletin.)

ON THE ATTITUDE OF THE INDIVIDUAL.

The foregoing examples of actual disease prevention, with still a large number of uncited examples, do not leave the question of disease prevention to opinion, however eminent multiplied and numerous opinions on this point may be; nor is the question dependent for solution upon scientific reasoning, however clear and strong such reasoning may be. This basic principle of all public health endeavor, disease preventability, *rests upon what has actually been accomplished.*

Now, it follows that if disease and death are preventable, those having power to prevent them are responsible for loss of life if this power is not used. Preventable disease is subject to public control and preventable death is, therefore, public crime.

And here, my hasty reader, pause a moment and consider the relation of the individual and the public. In 1873 William Budd, writing on typhoid fever (it could have been any other infectious disease), said: "And let no one suppose that this is a matter in which he has no personal interest. The duty itself we may evade, but we can never be sure of evading the penalties of its neglect. This disease not seldom attacks the rich, but it thrives among the poor. But by reason of our common humanity we are all, whether rich or poor, more nearly related here than we are apt to think. The members of the great human family are, in fact, bound together by a thousand secret ties of whose existence the world in general little dreams; and he that was never yet connected with his poorer neighbor by deeds of charity or love, may one

day find, when it is too late, that he is connected with him by a bond which may bring them both, at once, to a common grave."

There is no individual with enlightened public spirit who can disregard this most fundamental of all problems before us—the health problem.

TYPHOID FEVER—ITS HISTORY.

HEALTH TALK NO. X.

Ideas to be presented—(a) Definition and historical items. (b) The widespread geographic distribution and its explanation. (c) Frequency of the disease. (d) Its relation to the individual. (e) The individual's duty in the typhoid problem.

The word typhoid means a stupor-like fever. The disease was clearly separated from typhus fever, a disease which resembles it somewhat, in the forties of the last century. This latter disease, typhus fever, is now almost extinct. The cause of typhoid fever is a small germ called the typhoid germ or *bacillus typhosus*. This germ was discovered by Eberth, a German scientist, in 1880.

GEOGRAPHICAL.

"Typhoid fever is one of the most widespread of the infectious diseases. It occurs in the tropics, and in far northern and southern latitudes, at sea level and in the mountains, in the city and in the country, and practically wherever man may go and local conditions do not prevent the dissemination of the disease. The *B. typhosus* has about the same limits of latitude and longitude as man himself, and no country or race is known to be immune from the disease." * While this is true, it is also a fact that the frequency of the disease in different countries varies considerably. For example, typhoid fever is twice as frequent in the United States as in England and three times as frequent as in Germany. However, all authorities agree that this difference in distribution of the disease is *not* due to differences in soil, occupations, or amount of moisture in these different countries. A temperature of 80° to 95° does, by increasing germ growth and more particularly by bringing flies, increase the number of cases of typhoid. With the summer come flies and typhoid. With the exception of variations in frequency caused by differences in temperature in different parts of the world, all races are equally liable to this curse of filth. Dr. Osler's saying, "Typhoid fever is the best index to the sanitary intelligence of a community," is axiomatic with sanitarians.

*Osler's Modern Medicine, Vol. II.

FREQUENCY OF THE DISEASE.

Of every 100,000 inhabitants of the United States, 46.5 die every year from typhoid fever. To appreciate what this means, we may compare it with the typhoid death rate in other countries. This death rate per 100,000 population in Scotland is 6.2; in Germany 7.6; in England and Wales 11.2; in Belgium 16.2; in Austria 19.9; in Hungary 28.3; in Italy 35.2; in the United States 46.5. Differences in climate, soil and geographical peculiarities are not sufficient to explain these variations in death rates. Their explanation is dependent upon differences in the sanitary intelligence of the people in these different countries. We lose 35,000 lives every year in the United States from typhoid fever; in addition we have 350,000 others sick on an average of six weeks apiece. Certainly the typhoid problem is a grave concern for our country to grapple with.

IMPORTANCE OF TYPHOID TO THE INDIVIDUAL.

But what does it mean, not to the country, State, or community, but to you, just *you?* It means that if *you* come within the rule of probability, if your life is governed by rules instead of exceptions, you will have one chance out of six to have this disease, and one chance out of sixty to die with it; that is, in a family of a wife and four children, according to the rule, one of them will have this disease, and the chance is one out of sixty for one of your family to die with the disease.

THE INDIVIDUAL'S DUTY TO THE TYPHOID PROBLEM.

And what is the *least* you can do in the fight? "Knowledge is power," is the power that puts to flight this unseen foe, the typhoid germ which in *six* years kills more people than were killed on both sides during the *four* years of civil war; and which causes the loss of $350,000,000 to the United States every year. Equip yourself for your part of this fight with the knowledge of how the disease picks off its victims and how it may be prevented, and then, according to your circumstances, use this knowledge.

TYPHOID FEVER—ITS CAUSE.

HEALTH TALK No. XI.

Ideas to be presented—(a) Typhoid a germ disease. (b) Where the germ always comes from. (c) How long it can live outside the body. (d) The frequency of water infection. (e) Examples showing relation of water to the disease.

THE GERM.

A germ, the *bacillus typhosus*, causes every case of typhoid; and without it no case would ever occur. The proof of this is that every case with the well-known symptoms of this disease, when bacteriologically

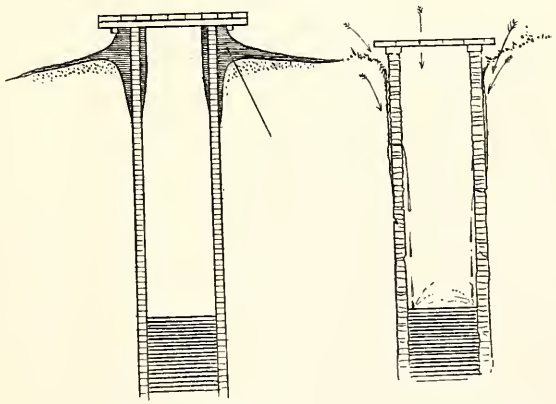
examined, reveals this particular germ; that measures known to destroy this germ will prevent the occurrence of the disease; that all epidemics successfully combated are controlled by measures directed against this germ; and that this germ injected into chimpanzees will produce the disease as it occurs in man. This germ is rod-shaped, about $\frac{1}{15000}$ of an inch long and half as thick as it is long. Seen under the high power of the microscope, it is very active, swimming like a snake.

ROUTE OF INFECTION.

The natural home of this germ is the intestine of one who is in the early unrecognized stage of the disease, or who is in a well-recognized attack of the disease, or one who has previously suffered a *recognized or unrecognized* attack of typhoid. See "Typhoid Carrier," under Health Talk XIV. The intestine is invariably the starting point of every case of typhoid. From the intestine of the infected it must reach the intestine of the uninfected to produce a second case. To make this trip it must first gain exit from the body harboring it. It gains this exit either in the stools from the bowels or in the urine from the bladder. Once out of the body, it may find its next victim by one of the following routes:

WATER ROUTE.

If a typhoid stool is thrown out upon the ground without having been first disinfected, it may be washed by the rains into the opening of a near-by well or into a brook or stream from which many people are



Well with surface pollution PROPERLY provided against.

Well with surface pollution IMPROPERLY provided against.

supplied with water. Or, the stool may become dissolved and percolate through the interstices of the soil, carrying with it the typhoid germs, until it reaches the water in a near-by well.

Right here the importance of definitely determining the vitality of typhoid germs under external conditions—away from their natural home, the human intestine—becomes apparent. If the typhoid germ dies quickly in soil or in water, then the water route is much less dangerous than it would be if this germ lived weeks, months, or years under these external conditions. They may live in ordinary soil several months. If in soil kept moist by a leaking drain, or in soil frequently moistened with beef soup, they will live two months. In fecal matter they will live longer than in ordinary soil. They have been found in garden soil which had been fertilized fourteen days previously with the contents of a five-months-old privy vault. The germ will live three months in distilled water. Its life in other water depends upon a number of variable factors, such as movement, light, chemical substances, and particularly upon the presence or absence of other bacteria or germs, many of which are inimical to the typhoid germ. They have been found alive eight days in drinking water, and they will very probably live a much longer time in the mud and scrapings from wells and reservoirs. Evidence indicates that these germs may live four or five days and travel a distance of eighty-five miles in river water. They have been known to live three months in ice. About 40 per cent of all typhoid in the United States is believed to be water borne.

Facts, proving the relation of water to the disease, are variations in the frequency of typhoid in two cities under identical conditions with the exception of water supply, which is taken from different sources; variation in frequency among the inhabitants of a single town which has two different water supplies; variation in the frequency of the disease in the same town before and after the installation of a filter, which is known to remove about 98 per cent of the germs in water. Hamburg, Germany, taking her water supply from the Elbe River close to where the city sewers emptied, had, between 1885 and 1888, 15,800 cases of typhoid. Wandsbeck, a neighboring city, with a different water supply, was practically free from the disease. In 1901, an epidemic occurred in New Haven, Connecticut, which resulted in 514 cases with 72 deaths. New Haven had five distinct water supplies. On one of these systems the source of the infection was found to be a patient who deposited the undisinfected stool where it was washed into the water supply. *Ninety-six* per cent of all the cases of this epidemic occurred in those using the polluted water supply. Only 4 per cent occurred in those using water from the other four systems. The effect of filtration, a process that removes 98 per cent of all the germs contained in water, is well shown in a number of instances. Paris put in a public filter and her typhoid death rate fell from 142 to only 17 per 100,000. Munich put in a filter and reduced a typhoid death rate from 291 to 10 per 100,000. Hamburg filtered her water supply and reduced her typhoid death rate from 40 to 7.2 per 100,000. Lawrence, Massachusetts, put in a public filter and her typhoid death rate dropped from 121 to 26 per 100,000.

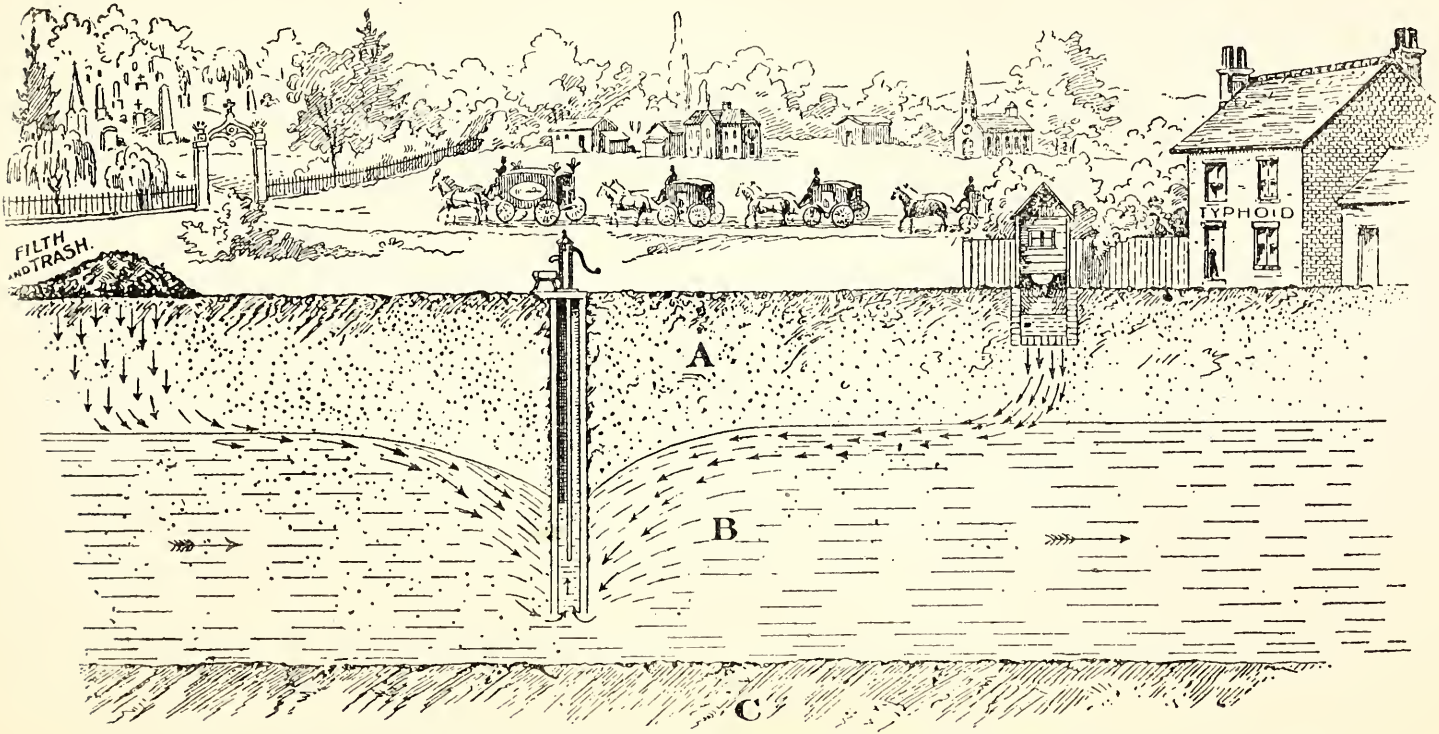


FIG. 2—THIS PICTURE SHOWS HOW PRIVY VAULTS AND WELLS SOMETIMES CONNECT UNDERGROUND, AND THE FUNERAL PROCESSION MAKES PLAIN THE OUTCOME. [Courtesy Indiana State Board of Health.]

Ten cities of New York—Albany, Binghamton, Elmira, Hornell, Hudson, Ithaca, Rensselaer, Schenectady, and Troy—filtered their water and reduced a previous death rate 56 per cent. Evidence showing the relation of impure water to typhoid fever could be almost indefinitely continued, but enough has been said to sustain the relationship.

TYPHOID FEVER—ITS CAUSE (Continued).

HEALTH TALK NO. XII.

Ideas to be presented—(a) Kind of food most apt to carry poison. (b) Percentage of milk epidemics. (c) How the germs get to the food. (d) Characteristics of milk epidemics. (e) Definition of contact infections. (f) Percentage of contact infections. (g) Where contact infection is most liable to occur.

FOOD ROUTE.

As cooking kills all germs, food containing typhoid germs must be food that has not been cooked, that is, *raw* food, *or* food that has been cooked and then handled by some one whose hands are contaminated with these germs. Naturally, the raw foods will be most likely to contain these germs. As milk is, by all odds, the commonest raw food consumed, and, as in cities it is handled by a large number of people before reaching the consumer, it is more often the means of transmission than all other raw foods combined. From 15 to 20 per cent of all epidemics are due to milk transmission. Occasionally other raw foods, such as oysters, clams, celery, water-cress, lettuce, onions, turnips and ice, may serve as the medium of transmission. Probably from 2 to 5 per cent of the total number of cases are carried by these foods. All of these raw foods—milk included—become the means of transmission by some one with the disease, or by some one who has had the disease and still carries the germs, having handled the food before it is swallowed; or by the handling of the food by some one who at the time is associated with a case of the disease; or by the vessels in which the food is contained having been washed in water that has become contaminated in some of the various ways mentioned under water route; or finally, by flies carrying the infectious material to the raw food over which they crawl. (See Fig. 3.)

There are a number of epidemics clearly traceable to milk. Characteristic of milk epidemics is the fact that when the town suffering has several dairies, over 90 per cent, often 95, 97, or even 98 per cent, of the cases will be on a single dairyman's route: these cases occur almost solely in the consumers of milk, and therefore the cases are more frequent in children than in adults, and more frequent among the better classes than the poorer classes, as the latter use less milk than the former; investigation nearly always reveals a case of the disease with

which some one of the dairy employees is more or less closely associated, when examination of the water supply shows the water pure. Lastly, milk epidemics are very rapid in onset, a large percentage of the cases coming down in the first week of the epidemic, whereas epidemics due to water are slower, more gradual, in onset.

CONTACT INFECTION.

By this we mean the contamination of an attendant's hands with microscopic bits of saliva, urine, or stool, through the handling of the

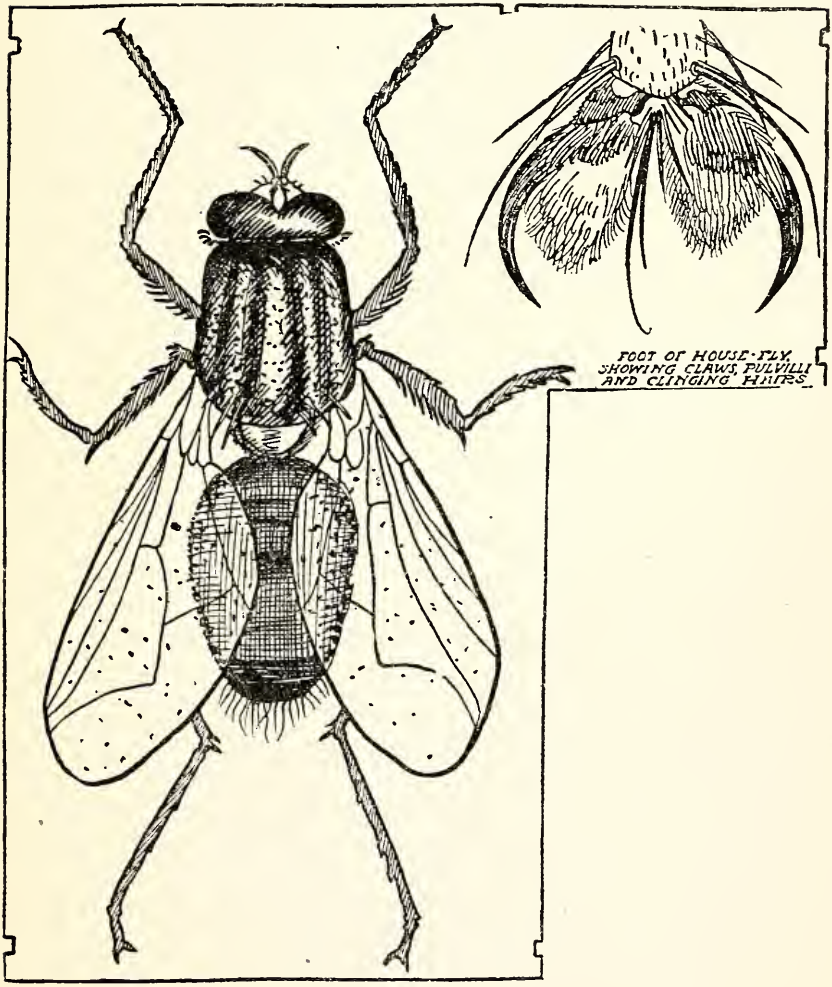


FIG. 3.

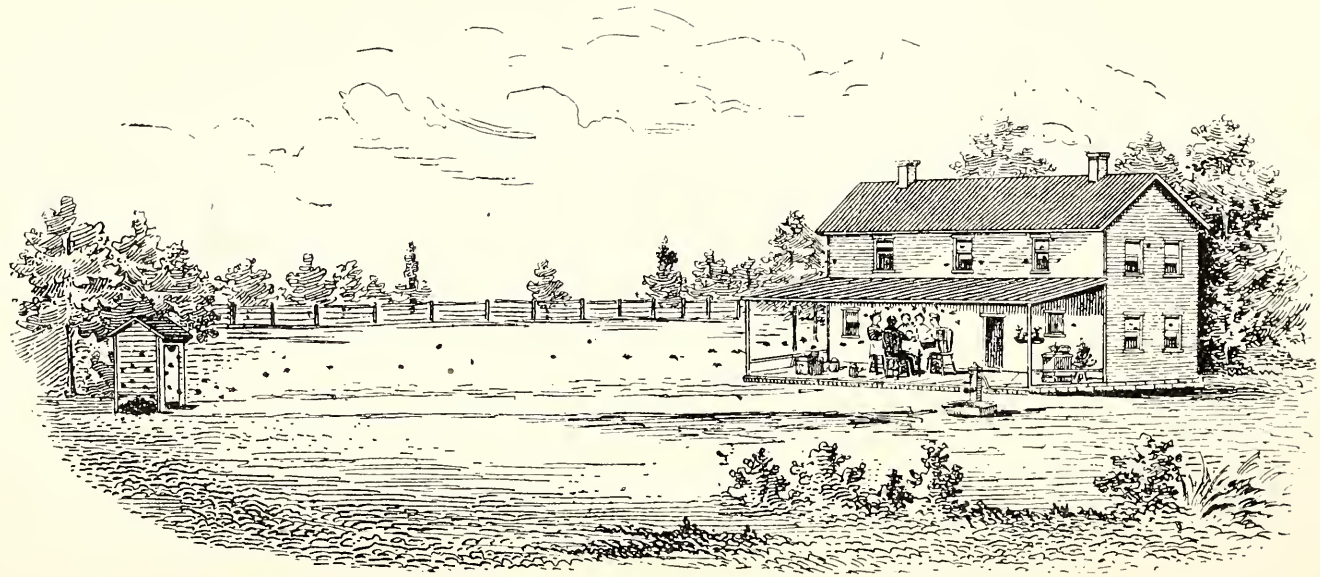


FIG. 4.—HOW FLIES CARRY TYPHOID GERMS ON THEIR FEET.

Fly-tight privies and well-screened houses will do much to keep typhoid away. [Courtesy Indiana State Board of Health].

body, or something that has touched the body, of a typhoid patient. The poison is then transferred to the mouth or to food that is later eaten. This would be avoided if attendants on typhoid patients would carefully wash the hands in an antiseptic wash after handling the patient or his belongings, or before they put their hands or something handled by them into their mouth. About 5 per cent of all cases are contracted in this way. The danger from this form of infection is directly proportionate to the sanitary intelligence and carefulness of those caring for the sick. The danger through contact infection is especially great where large numbers are thrown together, as in jails, and particularly in military encampments. Among 5,000 Boer prisoners held by the British army in the Ceylon hills, 700 of them had typhoid fever in three months. The guards using the same water and food supply escaped the disease. In private homes, statistics, based on 13,000 cases, show that 85 per cent of the cases occurred in houses where there was but one case. This fact should never be made an excuse for sanitary negligence in nursing the disease.

TYPHOID FEVER—ITS CAUSE (Continued).

HEALTH TALK NO. XIII.

Ideas to be presented—(a) Relation of places of filth through the fly to the kitchen and dining room. (b) The number of people capable of depositing typhoid germs promiscuously. (c) Experience at Chickamauga.

FLY ROUTE.

Look at Fig. 3; notice the hairy, bristly foot of the fly, to which sticky material clings in abundance. See Fig. 4 and Fig. 5, and remember, that when he leaves these places to enter the kitchen or dining room to light on your food *he doesn't wipe his feet.*

Remember again, that in the open privy—the chief loafing place of the fly between meals—the germs of typhoid fever and other intestinal diseases are deposited. A patient usually remains up and about a week or ten days before going to bed with typhoid. During this time the patient passes, in his stools, millions of typhoid germs. Again the Germans have shown that about 3 per cent of recovered cases still continue to harbor in their intestines and pass in their stools typhoid germs. Who can tell when some one in the early stages of the disease, or some one who has recovered from the disease and still carries the poison, will deposit in the open privy of your own back yard or in your neighbor's privy? If you live in town, some of these seed of disease and death which the flies carry will enter into your home.

When the United States concentrated her troops at Chickamauga in

FIG. 5
[Courtesy Florida State Board of Health].

1898, preparatory to the invasion of Cuba, some of the men arriving at camp were in the early stages of typhoid fever. Before going to bed with the disease, these soldiers deposited their infected stools in open ditches or latrines. Soon typhoid began to develop rapidly among the soldiers. The water supply of the camp was examined and found pure. The milk supply was likewise found above suspicion. It was noticed that the disease occurred almost exclusively in the soldiers who took their meals in the mess-halls that were unscreened. It was further noticed that the disease was most prevalent among the soldiers who ate in the mess-halls closest to the open latrines. As flies were abundant at the same time, this incriminating evidence pointed more and more clearly to that pest. Flour and lime were sprinkled upon the *excreta* in the latrines and a short time thereafter flies covered with white powder were found in the mess-halls. This strongly circumstantial proof was made conclusive when bacteriological examination of captured flies found myriads of typhoid germs both in and on their bodies.

Among 107,000 American soldiers there were 20,100 cases of typhoid and 1,580 deaths as a result of fly infection. Since the study of the fly in connection with this outbreak, numerous and independent works have placed beyond question the deadly role of the fly in this disease.

TYPHOID FEVER—ITS PREVENTION.

HEALTH TALK NO. XIV.

Ideas to be presented—(a) Responsibility for pollution of water supply. (b) Relation of privies to wells. (c) Precautions to be taken by nurse before preparing food for others. (d) A typhoid carrier.

Typhoid fever is a preventable disease. For every case of this disease, for every death from this disease, some one is responsible.

PROTECT THE WATER SUPPLY.

It has already been stated that 40 per cent of typhoid fever is water borne. Water supplies may be classed as public and private. The first supplies water to a large number of people and is subject to public control; the second supplies one or two or three families and is subject to individual control. When either a public or a private water supply becomes contaminated with typhoid germs and causes fever, those in charge of the care of the water are responsible.

If it is a public water supply infected, either the State Board of Health, the Legislature, or the courts are responsible. The State Board of Health is responsible, first, when laws adequate to have prevented the infection exist but have not been enforced by the board. Second,

when infection is due to the nonexistence of laws which the State Board of Health has *never* requested the Legislature to pass. The Legislature, representing the people, is responsible when they have refused to enact laws requested by the State Board of Health, which would have prevented the pollution of the water supply. The courts are responsible for the pollution of a public water supply and the sickness and death arising therefrom, when their attention is called by the State Board of Health to an infringement of a law protecting the purity of a water supply and when they fail to prosecute the guilty party or parties for the infringement. The duty of the citizen to public water supplies is to demand an explanation of these public servants in case of water borne diseases affecting a community using a public water supply. Where inefficiency is found the ballot and civic influence should be used to remove the inefficient official.

If a private supply is polluted the individual owning or controlling it is responsible for sickness and death resulting therefrom. The individual may be ignorant, but his ignorance is a fault—a sin—a grievous sin when it costs a life.

If the individual uses water from a cistern, caught from the roof, he will have no water-borne disease.

If he uses a spring or well it should be so situated with reference to privies or cesspools that no surface drainage can reach it, that is, the surface water during rains should not run from a privy or cesspool toward a spring. The surface opening of every water supply should be either on higher ground than the privy or cesspool or separate from it by a well-marked ridge. The percolation through the soil of fecal contaminating material is to be prevented by making the privy after plans and specifications of the Carolina Standard Sanitary Privy (see April Bulletin), or by cementing a cesspool, thereby insuring against leakage. In no case should well and privy be closer than 50 feet, and unless the standard privy is used, the distance should be at least 200 feet.

PREVENT FOOD INFECTION.

Do not allow any one in any way associated with a case of typhoid to handle the food at any stage of its preparation unless you are positively sure that the following precautions are taken. *First*, that the outer clothing is changed in going from the sick room to kitchen or dining room. *Second*, that the hands are disinfected in going from the sick room to the dining room or kitchen in disinfecting solution No. 1.

Remember the danger of transmission of typhoid by some one who years previously had the disease, has recovered from all the symptoms and effects, but who still carries the germs in his or her intestine, passes them in the stools or urine and frequently through pollution has them on his hands. People who have recovered from the disease ten to fifty years before have been known to transmit the disease in this way. These people are known as "typhoid carriers." As already stated,

about 3 per cent of all who recover from the disease continue to carry the germs—that is, continue to be "typhoid carriers." The most famous of these "typhoid carriers" is a cook in New York City, whom twenty-eight cases of typhoid were traced to. This is "Typhoid Mary." The health department examined her stools and found them swarming with typhoid germs.

Whenever a case of typhoid fever occurs in a household *where other possible sources of infection can be ruled out*, those having to do with the preparation of the food should be thought of as possible carriers.

TYPHOID FEVER—ITS PREVENTION (Continued).

HEALTH TALK No. XV.

Ideas to be presented—(a) How to prevent contact infection. (b) Difference in the handling of fly problem in towns and in the country. (c) How towns can control fly problem. (d) Importance of thorough disinfection of excreta. (e) Even greater importance of sanitary privy.

PREVENT CONTACT INFECTION.

By always washing the hands in disinfection solution No. 1 after touching the patient, his excretions, or *any* of his belongings. No one should use a patient's clothing or bed clothing until they are first soaked for *two* hours in disinfecting solution No. 1. (See last page.)

PREVENT THE TRANSMISSION OF THE DISEASE BY FLIES.

Of course, the ideal method of preventing the transmission of the disease by flies is to get rid of the flies. Cities and towns will certainly accomplish this at an early date. As 99 per cent of flies are bred in horse manure, the proper care of horse stables means fly extinction. Horse stables would receive this proper care if boards of aldermen would pass an ordinance requiring the licensing of all stables. One condition on which license would be granted would be proper construction of the stable; this would mean a good, tight wooden floor in every stable. Another condition on which license would be granted would be a license fee from each stable owner enough to compensate the town for having each stable thoroughly cleaned once a week. The town or city can not trust the stable owners to keep the stables cleaned. This must be done by the town under direction of the health department.

In rural districts fly breeding is more difficult to prevent. Dr. L. O. Howard says that "people living in agricultural communities will probably never be rid of this pest." This is due to the fact that the accumulation of manure for its fertilizing property does not enter into the consideration of the fly problem with the urban house owner as it

does with the farmer. Not until some cheap chemical solution, which sprinkled over the manure in small amounts will kill the fly eggs and larvæ, is discovered will the prevention of fly breeding in the country be attained in a practicable form.

But if we can not prevent fly breeding, we can prevent the flies from carrying the contents of the open privy to our food in the dining room and kitchen. We can have the sanitary privy described in the April Bulletin of the North Carolina Board of Health. This sanitary convenience does not cost more than six or eight dollars. Plans and specifications for such a structure will be furnished by the State Board of Health to any citizen without cost. No town should permit the use of any other kind of privy. This could easily be accomplished by an ordinance similar to the one suggested above for the regulation of horse stables.

In addition to the fly-proof privy, every dining room and kitchen should be effectually screened against flies. The few that enter should be caught on fly paper. *Remember flies mean filth, and the number of flies in any house or town is the best index to its cleanliness.*

THOROUGH DISINFECTION OF TYPHOID DISCHARGES.

If all infected discharges—the stools and urine—of typhoid patients, were thoroughly disinfected before flies lit upon them, or before they were thrown upon the soil to find their way into a private or public water supply, there would be no typhoid. As a matter of fact, it is impossible to disinfect all such discharges, because in the first week or ten days of the disease and in many cases for weeks, months and years after an attack, the patient, *without knowing it*, passes stools and urine infected with typhoid germs. It is for this reason that a sanitary privy where *all* discharges will be kept from flies, food and drink is the most important preventive measure. Nevertheless, many cases would be prevented if discharges were placed in solution No. 2, covered at once and left standing two hours before being emptied into the closet or buried within at least one foot of cover and at least 200 feet away from any well or spring.

DISINFECTING SOLUTIONS.

No. 1. One bichloride tablet to a pint of water, or one teaspoonful of the pure chemical to one gallon of water. Add enough ordinary washing bluing to color slightly so that no one will drink it for water, as it is very poisonous. Will keep indefinitely. It is to be used for washing hands and soaking infected clothing.

No. 2. One-third of a pound (about a teacupful) of cloride of lime to one gallon of water. Make up fresh each day. Use to disinfect stools and urine; one quart of the solution to each stool, and volume for volume for urine. Allow to stand at least one hour before emptying.

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